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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/800,422

03/11/2004

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EXAMINER

FOTAKIS, ARISTOCRATIS

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/800,422

Applicant(s)

TSATSANIS ET AL.

Examiner

Aristocratis Fotakis

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 - 11, 13 - 26 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/11/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a). Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 02/07/2007.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: Typing informalities has observed in Paragraph 0079, Line 1, "junction 565". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 – 10, 17 – 18, 22 and 24 - 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Cioffi et al.(US 5,995,567).

Re claims 1, 6, 17 and 24, Cioffi teaches of a method for processing a received signal in a multi-channel communication system (DMT, Col 4, Lines 4 – 8) to reduce unwanted noise (Col 3, Lines 27 – 39), the method comprising: receiving two or more

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signals (Col 3, Lines 28 – 31) over two or more channels (DMT, Col 4, Lines 4 – 8), wherein each of the two or more signals comprise a differential mode component (v_d , Fig.1) and a common mode component (v_c , #102, Fig.1) (Col 5, Lines 54 – 64); for at least one channel of the multi-channel communication system: isolating the differential mode component through a differential mode isolation unit (#102, Fig.1) providing the differential mode component to a junction (#202, Fig.2) (Col 5, Lines 54 – 64 and Col 6, Lines 36 - 54); isolating the common mode component through a common mode isolation unit (#102, Fig.1) providing the isolated common mode component to a filter (#208, Fig.2); processing the common mode component with the filter to generate a cancellation signal (v_n , #210, Fig.2); providing the cancellation signal to the junction (#202, Fig.2); and combining (subtraction, #202, Fig.2), within the junction, the cancellation signal with at least one signal received over the at least one channel to thereby remove the noise in the differential mode component from the signal received over the at least one channel (v_r , #210, Fig.2) (Col 5, Lines 54 – 64 and Col 6, Lines 36 - 54).

Re claim 2, Cioffi teaches of performing processing with a digital filter to thereby cause the common mode noise component to more closely resemble the differential mode noise component (#124, Fig.2, Col 7, Lines 18 – 40).

Re claim 3, Cioffi teaches of the channel comprising a twisted pair of conductors (Col 13, Lines 8 – 10).

Re claim 4, Cioffi teaches of the method performed on the signal received over each channel of a multi-channel communication system (DMT, Col 4, Lines 4 – 8).

Re claims 5 and 8, Cioffi teaches of isolating the common mode component utilizing one or more transformers (#120, Fig.1).

Re claim 7, Cioffi teaches of at least one twisted pair of conductors (Col 13, Lines 8 – 10) and the common mode component may be correlated to the noise in the differential mode component (Col 6, Lines 66 – 67 to Col 7, Lines 1 - 40).

Re claim 9, Cioffi teaches of the filter comprises processing the common mode component with a digital filter (#208, adaptive filter, Fig.2) having coefficients selected (#204, update circuitry, Fig.2) to modify the common mode noise component (#110, Fig.2) into a cancellation signal (#210, Fig.2) tailored to cancel the noise present (#202, subtraction, Fig.2) on the differential mode component of a particular channel (#114, Fig.2).

Re claim 10, Cioffi teaches of processing each common mode component isolated from each signal received over each channel (DMT, Col 4, Lines 4 – 8) with a filter (adaptive filter, Fig.2) tailored for each channel.

Re claim 18, Cioffi teaches of obtaining a center tap signal from a center tap of a transformer configured to receive the at least one signal, wherein the center tap signal comprises the common mode noise component (Col 5, Lines 58 – 64).

Re claim 22, Cioffi teaches of the multi-channel communication system operating in a discrete multi-tone modulation environment (DMT, Col 4, Lines 4 – 8).

Re claim 23, Cioffi teaches of the processing and filtering occurs on a frequency bin by frequency bin basis and the two or more signals are modulated based on a discrete multi-tone modulation scheme (DMT, Col 4, Lines 4 – 8).

Re claim 25, Cioffi teaches of one or more transformers configured to reject the differential mode component to thereby isolate the common mode component (Col 7, Lines 3 – 18).

Re claim 25, Cioffi teaches of the means for filtering (#208, Fig.2), receiving a common mode component (#110, Fig.2) associated with each signal received over each channel of the multi-channel communication system (DMT) and processes the common mode component to approximate the noise (#210, Fig.2) in the differential mode component (Col 7, Lines 5 – 40).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 11 and 13 - 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cioffi in view of Amrany et al. (US 6,999,504).

Re claim 11, Cioffi teaches of a communication system for processing a received signal (Fig.1) to isolate and cancel noise from two or more incoming signals (Abstract) comprising: two or more inputs (Col 3, Lines 54 – 55) configured to receive two or more incoming signals (Col 3, Lines 28 – 31); a common mode isolation unit comprising: at least one transformer (#102, Fig.1) configured to isolate a common mode component (v_c , #102, Fig.1); at least one digital filter (#208, Fig.2) configured to receive the common mode component and process the common mode component to generate a cancellation signal (v_n , #210, Fig.2); at least one junction (#202, Fig.2) associated with at least one channel configured to receive the cancellation signal and combine (subtraction, #202, Fig.2) the cancellation signal with at least one of the incoming signals received over the channel with which the junction is associated, wherein combining the cancellation signal with an incoming signal removes unwanted noise from

an incoming signal (Col 5, Lines 54 – 64 and Col 6, Lines 36 - 54). However, does not specifically teach of using at least two common mode isolation units.

Amrany teaches of a method and apparatus for reducing crosstalk in a telecommunication system. A common mode signal is utilized to obtain additional information that can be used to better approximate the transmitted signal (by approximating and canceling crosstalk or otherwise). A modem is provided having improved crosstalk cancellation circuitry for canceling crosstalk received on a local loop carrying modem communications. The modem includes a first input for receiving a signal carried on the local loop and a second input for receiving a signal obtained from the common mode. The modem further includes processing circuitry configured to either reduce crosstalk present in the signal carried on the local loop, or to otherwise closely approximate the remotely transmitted signal. Using both the first and second signals allows the processing circuitry of the modem to obtain more accurate results (Abstract). Amrany teaches of DSLAM (plurality of xDSL modems, #42, Fig.1) where each xDSL modem has a circuitry for determining the transmitted signal and circuitry to sense the common mode (common mode isolation unit in a xDSL modem, #200, Fig.4 and Fig.9, Col 10, Lines 57 – 65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the invention of Cioffi in a central office unit of multiple xDSL modems in DSLAM to remove the unwanted noise for each incoming signal.

Re claim 13, Cioffi teaches all the limitations of claim 12 as well as a transformer for isolating the common mode signal component. However, Cioffi does not specifically teach of an amplifier outputting the common mode component.

Amrani teaches of a circuit that is be utilized to obtain the common mode signal (Col 10, Lines 41 – 44, Fig.9). The common mode isolation unit comprises: a sensing transformer (T2, Fig.9) configured to receive the signal (through C1 and C2, Fig.9) and generate one or more electric fields (shown within the winding of T2) thereby generating a sensing winding signal in a sensing winding of the sensing transformer (passing through R1 and R2, Fig.9); amplifier (CP AFE, Fig.9) configured to receive the sensing winding signal or a signal representing the sensing winding signal and output a modified version of the sensing winding signal (amplified signal), wherein the modified version of the sensing winding signal comprise the common mode component (Col 10, Lines 57 – 65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used an amplifier to differentiate the incoming winding signal and outputting the common mode component with immunity to external noise.

Re claim 14, Cioffi teaches all the limitations of claim 12 as well as a transformer configured to receive the first signal for sensing and outputting the common mode signal component (Fig.1 and 2, Col 7, Lines 3 – 4 and Col 5, Lines 54 – 64). However, Cioffi does not specifically teach of an amplifier outputting the common mode component.

Amrani teaches of a circuit that is be utilized to obtain the common mode signal (Col 10, Lines 41 – 44, Fig.9). The common mode isolation unit comprises: a first transformer (T1, Fig.9), having a center tap connection, configured to receive the first signal ($r(t)$, Fig.9); a sensing transformer (T2, Fig.9) configured to receive the signal (through C1 and C2, Fig.9) and generate one or more electric fields (shown within the winding of T2) thereby generating a sensing winding signal in a sensing winding of the sensing transformer (passing through R1 and R2, Fig.9); an amplifier (CP AFE, Fig.9) configured to receive and amplify the sensing winding signal, which represents the common mode noise signal, and output a modified version (amplified signal) of the common mode noise signal ($P(t)$, Fig.9, (Col 10, Lines 57 – 65)).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used an amplifier to differentiate the incoming winding signal and outputting the common mode component with immunity to external noise.

Re claim 15, Cioffi teaches of line isolation (transformer and Paragraph 0176, Lines 19 – 25) associated with each channel (DMT), wherein a line isolation unit is configured to isolate the communication system from the communication channel.

Re claim 16, Cioffi teaches of the junction comprising a summing junction (#202, subtractor, Fig.2).

Claims 19 – 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cioffi in view of Vitenberg (US 6,459,739).

Re claims 19 and 20, Cioffi teaches all the limitations of claim 17 as well as obtaining a center tap signal from a center tap of a first transformer and generating one or more electric fields by passing the center tap signal to obtain the common mode signal (Col 5, Lines 58 – 64). However, Cioffi does not specifically teach how the common mode signal is sensed in the transformer (#210).

Vitenberg teaches of a receiver for high-speed data communications, which receives a differential signal through a pair of signal lines. The receiver includes a common-mode choke, which has first and second signal windings (Fig.1), which are respectively coupled in series to the pair of signal lines so as to attenuate common-mode interference in the differential signal. The choke (sensing transformer) also has a sampling winding, which is inductively coupled to the signal windings so as to generate a sampled signal responsive to current flowing in the signal windings. Signal processing circuitry is coupled to receive the sampled signal from the sampling winding and to receive the differential signal from the signal windings and to process the differential signal responsive to the sampled signal (Abstract and Fig.1 and Col 4, Lines 22 – 59 and Col 5, Lines 1 – 13).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a three winding choke (#24, #26, #54) with superior

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attenuation of RF interference, without the need for a resistive tap off the input lines to the receiver (Col 2, Lines 57 – 65).

Re claims 21, Cioffi teaches all the limitations of claim 17 except of amplifying the common mode noise signal prior to filtering.

Vitenberg teaches of amplifying the common mode noise signal prior to filtering (Col 5, Lines 1 – 13, Fig.1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have amplified the signal prior filtering to eliminate interference outside a frequency range of interest of the receiver (Col 5, Lines 1 – 13, Fig.1).

Allowable Subject Matter

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

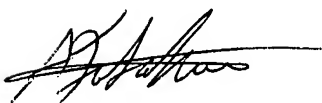
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aristocratis Fotakis whose telephone number is (571) 270-1206. The examiner can normally be reached on Monday - Thursday 7 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AF



CHIEH M. FAN
SUPERVISORY PATENT EXAMINER